

South Tyneside Hospital

Phase 3 Remediation Statement (Rev 1)

S180824

South Tyneside NHS Foundation Trust

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PHASE 3 REMEDIATION STATEMENT (REV 1)

SOUTH TYNESIDE HOSPITAL

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Revision	Date	Prepared By	Signed
Rev 1	September 2019	*A Cutts* *Senior Engineering Geologist*	[redacted]
		Checked By	
		R Woods *Principal Geotechnical Engineer*	[redacted]
		Approved By	
		R Woods *Principal Geotechnical Engineer*	[redacted]

1 OBJECTIVES & PRINCIPLES OF REMEDIATION STATEMENT

Solmek were commissioned by Billinghurst George and Partners on behalf of South Tyneside NHS Foundation Trust to prepare a Remediation Statement for the redevelopment of land at South Tyneside Hospital, South Tyneside. A site location plan is presented in Appendix A, Figure 1.

The site is expected to be developed with a new boiler house and Energy Centre with areas of hardstanding including access for vehicles. No new areas of soft landscaping are proposed in the development (see Appendix A, Figure 2).

The following reports have already been issued in respect of the site:

- *Phase 2 Site Investigation Report, Proposed Energy Centre, South Tyneside Hospital (S121041, December 2012)*

The original site investigation report didn't highlight raised levels of contamination, however during the construction phase of the development an area of ash and brick clay fill was unexpectedly encountered in one part of the site.

This Remediation Statement outlines the objectives required to render the site suitable for the proposed development and its immediate surroundings, which mainly comprises hospital buildings, open space and residential properties.

Site works shall be supervised periodically by a suitably qualified engineer. Agreed dates and milestones for site visits can be agreed between Solmek and the contractor following approval of the Remediation Statement from the Local Authority.

2 REMEDIATION STRATEGY

2.1 Previous and Current Land Use

The site, part of which had been a reservoir, more recently comprised a grassed area located within the north eastern part of the hospital grounds. The western part of the site was fenced off from the remainder and comprised a relatively level area of grass adjacent to a series of greenhouses and sheds. The remainder of the site comprised an area of grassed open space that rises steeply towards the north east.

Construction of the proposed boiler house and Energy Centre is currently underway with incidental earthworks being undertaken.

2.2 Ground Conditions

Information from the Solmek Phase 2 Site Investigation Report, S121041, December 2012, has been used to obtain brief ground conditions below. The investigation comprised a series of four cable percussive boreholes to depths of between 2.95m below ground level (bgl) and 10.00mbgl along with three trial pits to depths of between 2.50mbgl and 3.80mbgl.

2.2.1 Made Ground

Made ground was encountered across the site at various depths which reflect the position of the former reservoir. The western part of the site comprised clayey sandy gravelly topsoil to depths of 0.5mbgl and 1.1mbgl. The trial pits and boreholes drilled further east, at the location of the former reservoir, encountered topsoil over gravelly fill with whole bricks to a depth of 2.50mbgl and 2.95mbgl. The full extent of the made ground was not reached at these positions and a concrete base was encountered in both boreholes at 2.95mbgl.

On the raised area in the north east, the deepest made ground between 2.90mbgl and 3.10mbgl. This comprised clayey gravelly topsoil to 0.40mbgl over firm and stiff sandy gravelly clay fill with ceramics, glass, bricks and metal fragments.

2.2.2 Natural Deposits

The natural deposits within the boreholes comprised firm and stiff locally soft clay. This was proven at shallow depths in the west of the site (0.50-1.10mbgl) and from 2.90 and 3.10mbgl in the east of the site. The clay was proven to extend to 4.90mbgl and 7.45mbgl. The underlying deposits comprised stiff sandy gravelly clay to 10.00mbgl.

2.2.3 Groundwater

Groundwater was not encountered in the majority of positions with the exception of perched water within the fill materials locally at a depth of 2.00mbgl.

It should be noted that the rapid progression of exploratory positions may mask groundwater seepages and groundwater levels fluctuate with a number of influences such as seasonal and climatic variations as well as in proximity to local dewatering and abstraction schemes. Therefore, water levels significantly higher than those encountered during this investigation may be encountered.

2.3 Historical Contamination Results and Assessment From Site Investigation Report

2.3.1 Contamination Results

To provide information upon the possibility of ground contamination three samples of fill materials (one topsoil, one clay fill and one granular fill) were subject to chemical contamination analysis. The samples were subjected to a range of tests including metals, semi metals, non-metals and inorganic contaminants. In addition the samples were selected for asbestos analysis.

Given the sites end use, the test results were compared to a series of LQM/CIEH Suitable 4 Use Levels (S4UL) based on a commercial land use.

None of the samples tested returned concentrations which exceed the thresholds for metals, semi-metals and non-metals. Water soluble sulphate was recorded at maximum concentration of 140mg/l. Levels of cyanide were below 0.4mg/kg. The results of the pH testing were between 8.8 and 10.0 (alkaline conditions). No asbestos fibres were detected in the three samples tested.

2.3.2 Contamination Analysis

Given the levels of contaminants recorded on site, from the samples tested to date, it was considered that they are unlikely to pose a risk to the current and future users of the site. This was based on the low sensitivity of the site and that any insitu contamination will remain beneath areas of permanent hardcover such as parking areas and the building footprint itself.

Construction workers would be exposed to the elevated levels of pH and nickel (falling into the contaminated category) when in contact with the fill. Appropriate PPE was therefore recommended and adopting suitable hygiene practices along with damping down the site to reduce dust and prevent windblown contaminants leaving site.

To establish if the levels of contaminants present on site may pose a risk to vegetation the results of the contamination testing were compared to a series of threshold values published in "*Code of Good Agricultural Practice for the Protection of Soil"*. Following comparison, a single elevated mercury concentration was recorded within the clay fill at one location, none of the remaining phytotoxic determinants were above the corresponding thresholds. The report stated that should soft landscaped areas be proposed, the existing topsoil onsite should be suitable for re-use provided it is firstly screened to remove any deleterious material and place beneath areas of permanent hardcover. A clean cover system comprising at least 200mm of screened, clean topsoil should be placed in all proposed soft landscaped areas.

The risk to controlled waters was considered low given the low contamination profile of the ground and continuous layer of practically impermeable clay across the site.

In terms of utility suppliers, levels of arsenic, mercury and alkaline pH values exceeded relevant threshold values. Prior to laying any new services consultation with the utility providers was recommended.

2.4 Unexpected Contamination

The site was visited in August 2018 to observe the removal of an area of fill materials encountered around the proposed turning area adjacent to the proposed energy centre. Figure 3 shows the approximate location of the contaminated ground. Plates 1 and 2 show photographs of the contaminated material with Plate 1 showing the northern part of the turning area and Plate 2 the southern part. The material comprised brick rubble with ash in a clay bound matrix.

The materials were previously tested in April and May 2018. Four samples (2no. clay and one each of topsoil and ash) were selected for testing by Ian Farmer Associates. The results are presented in Appendix B.

All four samples were selected for metals analysis and Waste Acceptance Criteria (WAC). The soil test results were compared against a series of LQM/CIEH Suitable 4 Use Levels (S4UL) based on a commercial land use. The latest LQM/CIEH S4UL were published in December 2014.

By comparing the results with the thresholds as presented in the table within Appendix C it shows that all four samples tested were below commercial threshold values. The WAC test results indicated that the majority of determinants fell within the inert waste category, however Loss on Ignition and Total Organic Carbon were raised into the Hazardous Landfill Waste Category.

2.5 Objectives

Based on the Site Investigation Report, the following remediation targets have been determined:

- To resolve contamination issues in order to protect those receptors identified to be at risk, and thereby render the site suitable for the proposed development.

2.6 General

The purpose of the remediation works is to:

- To reduce liabilities associated with ground conditions by reclaiming the site within a framework of risk assessment.
- To facilitate successful redevelopment of the site for development within the existing constraints.
- To ensure that the public and residents around the site are not exposed to contamination.
- To make the site safe for future occupiers.
- To enable the site ground quality to comply with UK environmental legislation.
- To provide a sustainable and cost-effective solution.

2.7 Proposed Remediation Strategy

The above objectives will be achieved by undertaking the following remediation works prior to development taking place:

Hard Landscaped Areas

- Areas beneath proposed roads, parking zones, footpaths and other areas of hard landscape including the building footprint itself will require little or no remediation other than removal of materials to satisfy appropriate formation levels for construction. These areas provide a barrier to potential underlying contamination within the made ground and along with suitable installed drainage protects groundwater from surface infiltration.

Treating Unknown Contamination

- During any construction activities should any zones of odorous, brightly coloured or suspected contaminated ground be encountered then work should cease immediately in that area until Solmek have been contacted and visited site. Further contamination testing may be required. The results of the tests will determine whether or not material may remain on site or be disposed of in a safe manner.
- The ashy rubble clay fill will be transported and buried in a soft landscaped area to the south of the hospital complex to the south east of the Pathology Building and fronting John Reid Road. It will be covered with a clean cover of topsoil capping (see Appendix A, Figure 4).

- A 300mm capping of onsite topsoil should be placed over the excavated material. It is recommended that six samples of the topsoil to be used to cap the encapsulated made ground should be taken to prove suitability for use.
- If results show elevated determinands within samples tested, the topsoil cap should be removed from site and clean materials imported.

3 VALIDATION TESTING

On satisfactory completion of the works Solmek will provide a Validation Report to the Client. The Validation Report will provide certification that the remediation works have been carried out in accordance with this Remediation Statement. The Validation Report will include a summary of the remediation works undertaken, laboratory test results and details of any other relevant matters.

A Validation Report will be issued on completion of works that will cover the following elements:

- Photographic evidence.
- Topsoil test results.
- Evidence of any waste disposal/importation records (if required).

The contractor will be responsible for providing the necessary site information for use in the Validation Report. This will include volumes of materials, waste disposal records, surveys for base digs etc.

Based on the findings presented within the Site Investigation Report; any excavated surplus materials will undergo the following suite of testing:

3.1 Soils Analysis

- Inorganic determinants (metals, semi-metals and non-metals)
- TPHCWG
- Speciated PAH
- Phenol
- pH
- Organic Matter Content
- Asbestos and Asbestos Quantification

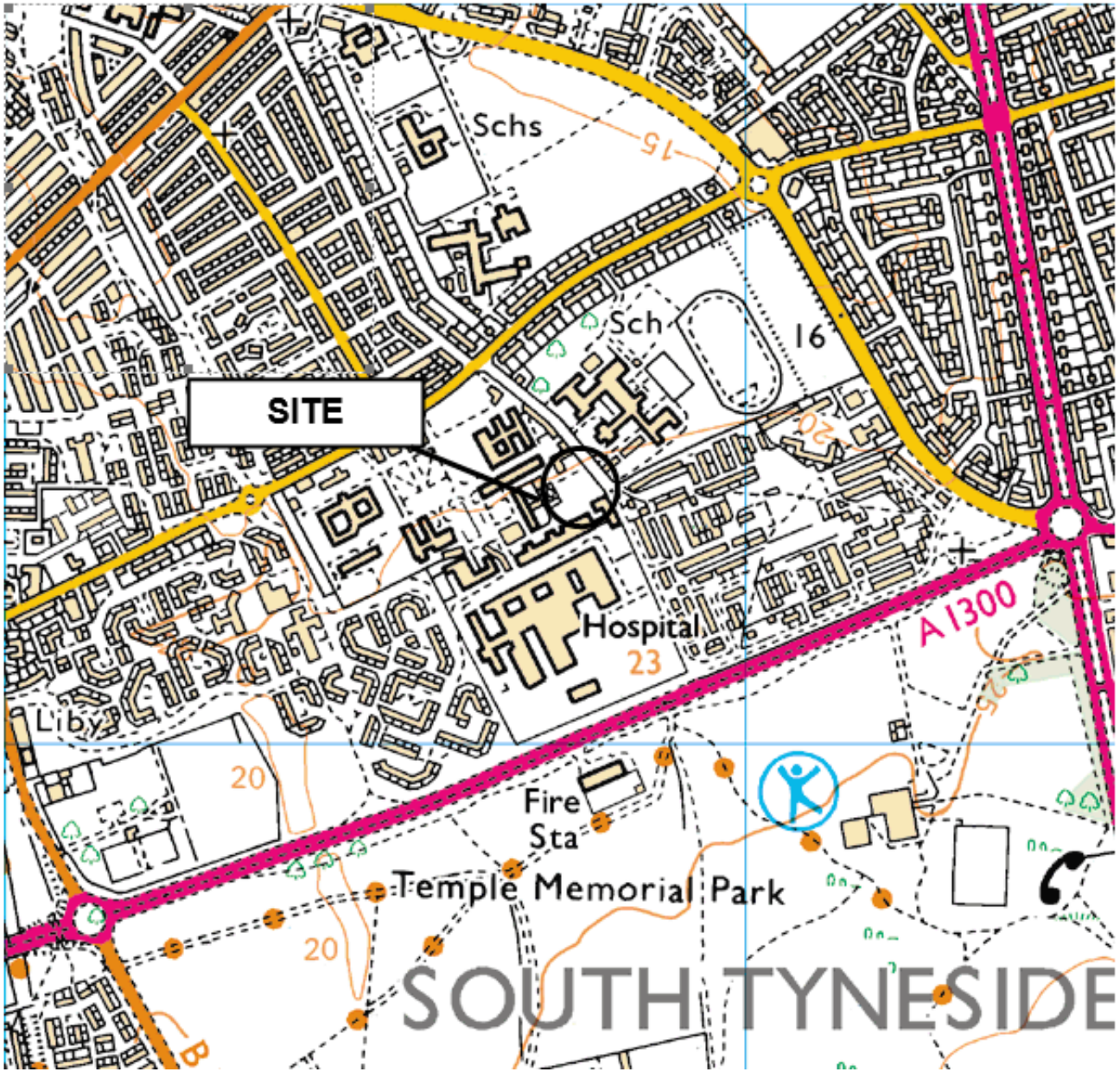
Given the low sensitivity of the proposed development the soil test results should be compared against a series of LQM/CIEH Suitable 4 Use Levels (S4UL) based on a commercial land use.

The latest LQM/CIEH S4UL were published in December 2014. In the absence of LQM/CIEH S4UL, Category 4 Screening Levels (March 2014), EA CLEA Thresholds and EA Upper Tier Threshold values shall be adopted.

The S4UL threshold value tables are shown in Appendix C.

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APPENDIX A



Title
Site Location Map

Project
South Tyneside Hospital

Client
South Tyneside NHS Foundation

Date
September 2019

Fig No.
Figure 1

Scale
Do Not Scale

Key

N

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Stockton-on-Tees
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Fax: +44 (0) 1642 612355
e-mail: south@solmek.com
www.solmek.com

SOLMEK



Title
Proposed Layout

Project
South Tyneside Hospital

Client
South Tyneside NHS Foundation

Date
September 2019

Fig No.
Figure 2

Scale
Do Not Scale

Key

N

Solmek Ltd.
12 Yarm Road
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www.solmek.com

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Title
Approx Location of Contamination

Project
South Tyneside Hospital

Client
South Tyneside NHS Foundation

Date
September 2019

Fig No.
Figure 3

Scale
Do Not Scale

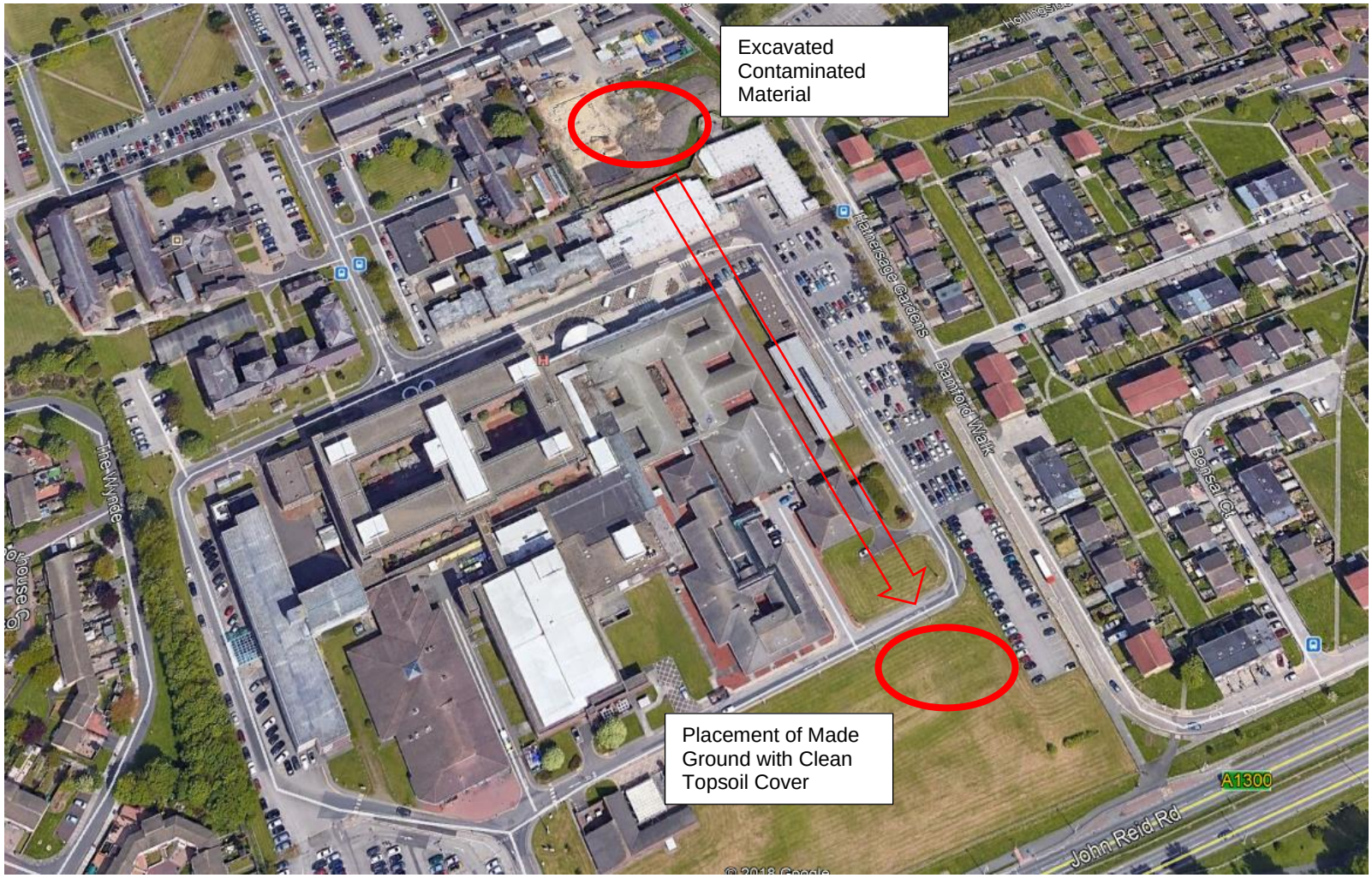
Key

N

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Title
Contaminated Material Placement

Project
South Tyneside Hospital

Client
South Tyneside NHS Foundation

Date
September 2019

Fig No.
Figure 4

Scale
Do Not Scale

Key

N

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Plate 1: Northern part of proposed turning area (August 2018)



Plate 2: Southern part of proposed turning area (August 2018)

Title	**Date**
View of Contaminated Materials on Site	September 2019
Project	**Plate No**
South Tyneside Hospital	1 & 2
Client	
South Tyneside NHS Foundation Trust	

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APPENDIX B

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 18/03075
Issue Number: 1 **Date:** 30 April, 2018

Client:
Ian Farmer Associates (Newcastle)
Unit 4, Faraday Close
Pattinson North Industrial Estate
Washington
Tyne and Wear
NE38 8QJ

Project Manager: Ceg[redacted]
Project Name: South Tyneside District Hospital
Project Ref: 18678
Order No: 73030
Date Samples Received: 24/04/18
Date Instructions Received: 24/04/18
Date Analysis Completed: 30/04/18

Prepared by:
[redacted]
Laboratory Coordinator

Approved by:
[redacted]
Managing Director

Envirolab Job Number: 18/03075

Client Project Name: South Tyneside District Hospital

Client Project Ref: 18678

Lab Sample ID	18/03075/1	18/03075/2	18/03075/3						Units	Method ref
Client Sample No	Topsoil	Ash	Clay							
Client Sample ID	M11987/1	M11987/2	M11987/3							
Depth to Top										
Depth To Bottom										
Date Sampled	20-Apr-18	20-Apr-18	20-Apr-18							
Sample Type	Soil	Soil	Soil							
Sample Matrix Code	6AE	6A	6							
% Stones >10mm$_A$	9.5	13.8	<0.1						% w/w	A-T-044
Antimony$_D$	7	5	<5						mg/kg	A-T-024s
Arsenic$_D^{M\#}$	9	23	2						mg/kg	A-T-024s
Barium$_D$	428	993	138						mg/kg	A-T-024s
Cadmium$_D^{M\#}$	2.0	2.7	2.3						mg/kg	A-T-024s
Copper$_D^{M\#}$	97	141	14						mg/kg	A-T-024s
Chromium$_D^{M\#}$	35	35	42						mg/kg	A-T-024s
Lead$_D^{M\#}$	252	784	37						mg/kg	A-T-024s
Mercury$_D$	0.27	0.59	0.34						mg/kg	A-T-024s
Molybdenum$_D^{M\#}$	5	7	<1						mg/kg	A-T-024s
Nickel$_D^{M\#}$	48	66	26						mg/kg	A-T-024s
Selenium$_D^{M\#}$	2	2	3						mg/kg	A-T-024s
Zinc$_D^{M\#}$	637	241	59						mg/kg	A-T-024s

REPORT NOTES

General:
This report shall not be reproduced, except in full, without written approval from Envirolab.
All samples contained within this report, and any received with the same delivery, will be disposed of one month after the date of this report.
Analytical results reflect the quality of the sample at the time of analysis only.
Opinions and interpretations expressed are outside the scope of our accreditation.
If results are in italic font they are associated with an AQC failure and there is insufficient sample to repeat the analysis. These are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

Soil chemical analysis:
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:
Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.
Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.
Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

Key:
IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Superscript "M" indicates method accredited to MCERTS.
Subscript "A" indicates analysis performed on the sample as received.
Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Please contact us if you need any further information.

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 18/03305
Issue Number: 1 **Date:** 10 May, 2018

Client:
Ian Farmer Associates (Newcastle)
Unit 4, Faraday Close
Pattinson North Industrial Estate
Washington
Tyne and Wear
NE38 8QJ

Project Manager: Ceg[redacted]
Project Name: South Tyneside District Hospital
Project Ref: 18678B
Order No: 73047
Date Samples Received: 30/04/18
Date Instructions Received: 01/05/18
Date Analysis Completed: 10/05/18

Prepared by:

[redacted]
Administrative Assistant

Approved by:

[redacted]
Analytical Consultant

Envirolab Job Number: 18/03305

Client Project Name: South Tyneside District Hospital

Client Project Ref: 18678B

Lab Sample ID	18/03305/1									
Client Sample No	Clay									
Client Sample ID	M12004									
Depth to Top										
Depth To Bottom										
Date Sampled	27-Apr-18									
Sample Type	Soil									
Sample Matrix Code	6									
% Stones >10mm$_A$	<0.1								% w/w	A-T-044
Antimony$_D$	<5								mg/kg	A-T-024s
Arsenic$_D^{M\#}$	15								mg/kg	A-T-024s
Barium$_D$	398								mg/kg	A-T-024s
Cadmium$_D^{M\#}$	1.3								mg/kg	A-T-024s
Copper$_D^{M\#}$	63								mg/kg	A-T-024s
Chromium$_D^{M\#}$	38								mg/kg	A-T-024s
Lead$_D^{M\#}$	318								mg/kg	A-T-024s
Mercury$_D$	0.69								mg/kg	A-T-024s
Molybdenum$_D^{M\#}$	3								mg/kg	A-T-024s
Nickel$_D^{M\#}$	48								mg/kg	A-T-024s
Selenium$_D^{M\#}$	<1								mg/kg	A-T-024s
Zinc$_D^{M\#}$	279								mg/kg	A-T-024s

REPORT NOTES

General:
This report shall not be reproduced, except in full, without written approval from Envirolab.
All samples contained within this report, and any received with the same delivery, will be disposed of one month after the date of this report.
Analytical results reflect the quality of the sample at the time of analysis only.
Opinions and interpretations expressed are outside the scope of our accreditation.
If results are in italic font they are associated with an AQC failure and there is insufficient sample to repeat the analysis. These are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

Soil chemical analysis:
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:
Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.
Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.
Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

Key:
IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Superscript "M" indicates method accredited to MCERTS.
Subscript "A" indicates analysis performed on the sample as received.
Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Please contact us if you need any further information.

envirolab
Units 7 & 8, Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

Final Test Report

Envirolab Job Number:	18/03075
Issue Number:	1
Date:	30-Apr-18

Client: Ian Farmer Associates (Newcastle)
Unit 4, Faraday Close
Pattinson North Industrial Estate
Washington
Tyne and Wear
NE38 8QJ

Project Manager:	Ceg[redacted]
Project Name:	South Tyneside District Hospital
Project Ref:	18678
Order No:	73030
Date Samples Received:	24-Apr-18
Date Instructions Received:	24-Apr-18
Date Analysis Completed:	30-Apr-18

Notes - Soil analysis

All results are reported as dry weight (<40°C).

For samples with Matrix Codes 1 - 6 natural stones >10mm are removed or excluded from the sample prior to analysis and reported results corrected to a whole sample basis.

For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis.

Notes - General

This report shall not be reproduced, except in full, without written approval from Envirolab.

Subscript "A" indicates analysis performed on the sample as received. "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve, unless asbestos is found to be present in which case all analysis is performed on the sample as received.

All analysis is performed on the dried and crushed sample for samples with Matrix Code 7 and this supercedes any "A" subscripts.

All analysis is performed on the sample as received for soil samples from outside the European Union and this supercedes any "D" subscripts

Superscript "M" indicates method accredited to MCERTS.

For complex, multi-compound analysis, quality control results do not always fall within chart limits for every compound and we have criteria for reporting in these situations.

If results are in italic font they are associated with such quality control failures and may be unreliable.

A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid

Predominant Matrix Codes: 1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample

Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited

Secondary Matrix Codes: A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

IS indicates Insufficient sample for analysis, NDP indicates No Determination Possible and NAD indicates No Asbestos Detected.

Superscript # indicates method accredited to ISO 17025.

Analytical results reflect the quality of the sample at the time of analysis only. Opinions and interpretations expressed are outside the scope of our accreditation.

Please contact us if you need any further information.

Prepared by: [redacted]

Laboratory Coordinator

Approved by: [redacted]

Managing Director

UKAS TESTING
No. 1247

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

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Landfill WAC analysis must not be used for hazardous waste classification purposes. This analysis is only applicable for landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Sample Details								Landfill Waste Acceptance Criteria Limits		
Lab Sample ID	Method	ISO17025	MCERTS	18/03075/1						
Client Sample Number				Topsoil				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Client Sample ID				M11987/1						
Depth to Top										
Depth to Bottom										
Date Sampled				20/04/2018						
Sample Type				Soil						
Sample Matrix Code				6AE						
Solid Waste Analysis										
pH (pH Units)$_D$	A-T-031	Y	Y	**7.99**				-	>6	-
ANC to pH 4 (mol/kg)$_D$	A-T-ANC	N	N	**0.12**				-	to be evaluated	to be evaluated
ANC to pH 6 (mol/kg)$_D$	A-T-ANC	N	N	**0.03**				-	to be evaluated	to be evaluated
Loss on Ignition (%)$_D$	A-T-030	Y	N	**10.4**				-	-	10
Total Organic Carbon (%)$_D$	A-T-032	Y	Y	**8.29**				3	5	6
PAH Sum of 17 (mg/kg) $_A$	A-T-019	N	N	**11.9**				100	-	-
Mineral Oil (mg/kg)$_A$	A-T-007	N	N	**23**				500	-	-
Sum of 7 PCBs (mg/kg)$_D$	A-T-004	N	N	**<0.007**				1	-	-
Sum of BTEX (mg/kg)$_A$	A-T-022	N	N	**<0.01**				6	-	-
Eluate Analysis				**2:1**	**8:1**	**2:1**	**Cumulative 10:1**	**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)**		
				mg/l		**mg/kg**				
Arsenic	A-T-025	Y	N	0.005	0.006	0.013	**0.060**	0.5	2	25
Barium	A-T-025	Y	N	0.081	0.037	0.186	**0.420**	20	100	300
Cadmium	A-T-025	Y	N	<0.001	<0.001	<0.002	**<0.01**	0.04	1	5
Chromium	A-T-025	Y	N	<0.001	<0.001	<0.002	**<0.01**	0.5	10	70
Copper	A-T-025	Y	N	0.013	0.007	0.030	**0.080**	2	50	100
Mercury	A-T-025	Y	N	<0.0005	<0.0005	<0.001	**<0.005**	0.01	0.2	2
Molybdenum	A-T-025	Y	N	0.006	0.002	0.014	**0.030**	0.5	10	30
Nickel	A-T-025	Y	N	0.002	<0.001	0.005	**0.010**	0.4	10	40
Lead	A-T-025	Y	N	0.020	0.010	0.047	**0.120**	0.5	10	50
Antimony	A-T-025	Y	N	0.008	0.003	0.018	**0.040**	0.06	0.7	5
Selenium	A-T-025	Y	N	<0.001	<0.001	<0.002	**<0.01**	0.1	0.5	7
Zinc	A-T-025	Y	N	0.029	0.004	0.066	**0.060**	4	50	200
Chloride	A-T-026	Y	N	10	2	23	**23**	800	15000	25000
Fluoride	A-T-026	Y	N	0.6	0.5	1.4	**5.0**	10	150	500
Sulphate as SO_4	A-T-026	Y	N	20	15	46	**162**	1000	20000	50000
Total Dissolved Solids	A-T-035	N	N	165	59	379	**703**	4000	60000	100000
Phenol Index	A-T-050	N	N	<0.01	<0.01	<0.02	**<0.1**	1	-	-
Dissolved Organic Carbon	A-T-032	N	N	<20.0	<20.0	<40	**<200**	500	800	1000
Leach Test Information										
pH (pH Units)	A-T-031	N	Y	7.2	7.8					
Conductivity (µS/cm)	A-T-037	N	N	329	118					
Mass Sample (kg)				0.200						
Dry Matter (%)	A-T-044	N	N	83.4						
Stage 1										
Volume Leachant, L_2 (l)	A-T-046			0.350						
Filtered Eluate Volume, VE_1 (l)	A-T-046			0.150						
Stage 2										
Volume Leachant, L_8 (l)	A-T-046			1.330						

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Sample Details								Landfill Waste Acceptance Criteria Limits		
Lab Sample ID	Method	ISO17025	MCERTS	18/03075/2						
Client Sample Number				Ash				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Client Sample ID				M11987/2						
Depth to Top										
Depth to Bottom										
Date Sampled				20/04/2018						
Sample Type				Soil						
Sample Matrix Code				6A						
Solid Waste Analysis										
pH (pH Units)$_D$	A-T-031	Y	Y	**8.12**				-	>6	-
ANC to pH 4 (mol/kg)$_D$	A-T-ANC	N	N	**<0.01**				-	to be evaluated	to be evaluated
ANC to pH 6 (mol/kg)$_D$	A-T-ANC	N	N	**<0.01**				-	to be evaluated	to be evaluated
Loss on Ignition (%)$_D$	A-T-030	Y	N	**13.6**				-	-	10
Total Organic Carbon (%)$_D$	A-T-032	Y	Y	**12.4**				3	5	6
PAH Sum of 17 (mg/kg) $_A$	A-T-019	N	N	**3.53**				100	-	-
Mineral Oil (mg/kg)$_A$	A-T-007	N	N	**17**				500	-	-
Sum of 7 PCBs (mg/kg)$_D$	A-T-004	N	N	**<0.007**				1	-	-
Sum of BTEX (mg/kg)$_A$	A-T-022	N	N	**<0.01**				6	-	-
Eluate Analysis				**2:1**	**8:1**	**2:1**	**Cumulative 10:1**	**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)**		
				mg/l		**mg/kg**				
Arsenic	A-T-025	Y	N	0.003	0.005	0.007	**0.050**	0.5	2	25
Barium	A-T-025	Y	N	0.070	0.042	0.172	**0.460**	20	100	300
Cadmium	A-T-025	Y	N	<0.001	<0.001	<0.002	**<0.01**	0.04	1	5
Chromium	A-T-025	Y	N	0.010	0.004	0.025	**0.050**	0.5	10	70
Copper	A-T-025	Y	N	0.007	0.003	0.018	**0.030**	2	50	100
Mercury	A-T-025	Y	N	<0.0005	<0.0005	<0.001	**<0.005**	0.01	0.2	2
Molybdenum	A-T-025	Y	N	0.018	0.006	0.045	**0.070**	0.5	10	30
Nickel	A-T-025	Y	N	0.002	<0.001	0.004	**<0.01**	0.4	10	40
Lead	A-T-025	Y	N	0.027	0.008	0.067	**0.100**	0.5	10	50
Antimony	A-T-025	Y	N	0.009	0.004	0.023	**0.050**	0.06	0.7	5
Selenium	A-T-025	Y	N	0.002	<0.001	0.004	**<0.01**	0.1	0.5	7
Zinc	A-T-025	Y	N	0.039	<0.001	0.095	**0.050**	4	50	200
Chloride	A-T-026	Y	N	7	1	17	**17**	800	15000	25000
Fluoride	A-T-026	Y	N	1.0	0.6	2.5	**7.0**	10	150	500
Sulphate as SO_4	A-T-026	Y	N	29	7	71	**92**	1000	20000	50000
Total Dissolved Solids	A-T-035	N	N	167	54	408	**670**	4000	60000	100000
Phenol Index	A-T-050	N	N	<0.01	<0.01	<0.02	**<0.1**	1	-	-
Dissolved Organic Carbon	A-T-032	N	N	<20.0	<20.0	<40	**<200**	500	800	1000
Leach Test Information										
pH (pH Units)	A-T-031	N	Y	7.4	7.8					
Conductivity (µS/cm)	A-T-037	N	N	334	107					
Mass Sample (kg)				0.200						
Dry Matter (%)	A-T-044	N	N	79.8						
Stage 1										
Volume Leachant, L_2 (l)	A-T-046			0.350						
Filtered Eluate Volume, VE_1 (l)	A-T-046			0.150						
Stage 2										
Volume Leachant, L_8 (l)	A-T-046			1.280						

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Sample Details								Landfill Waste Acceptance Criteria Limits		
Lab Sample ID	Method	ISO17025	MCERTS	18/03075/3						
Client Sample Number				Clay				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Client Sample ID				M11987/3						
Depth to Top										
Depth to Bottom										
Date Sampled				20/04/2018						
Sample Type				Soil						
Sample Matrix Code				6						
Solid Waste Analysis										
pH (pH Units)$_D$	A-T-031	Y	Y	**8.09**				-	>6	-
ANC to pH 4 (mol/kg)$_D$	A-T-ANC	N	N	**0.03**				-	to be evaluated	to be evaluated
ANC to pH 6 (mol/kg)$_D$	A-T-ANC	N	N	**0.01**				-	to be evaluated	to be evaluated
Loss on Ignition (%)$_D$	A-T-030	Y	N	**4.8**				-	-	10
Total Organic Carbon (%)$_D$	A-T-032	Y	Y	**1.95**				3	5	6
PAH Sum of 17 (mg/kg)$_A$	A-T-019	N	N	**<0.08**				100	-	-
Mineral Oil (mg/kg)$_A$	A-T-007	N	N	**<10**				500	-	-
Sum of 7 PCBs (mg/kg)$_D$	A-T-004	N	N	**<0.007**				1	-	-
Sum of BTEX (mg/kg)$_A$	A-T-022	N	N	**<0.01**				6	-	-
Eluate Analysis				**2:1**	**8:1**	**2:1**	**Cumulative 10:1**	**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)**		
				mg/l		**mg/kg**				
Arsenic	A-T-025	Y	N	<0.001	<0.001	<0.002	**<0.01**	0.5	2	25
Barium	A-T-025	Y	N	0.029	0.009	0.071	**0.120**	20	100	300
Cadmium	A-T-025	Y	N	<0.001	<0.001	<0.002	**<0.01**	0.04	1	5
Chromium	A-T-025	Y	N	<0.001	<0.001	<0.002	**<0.01**	0.5	10	70
Copper	A-T-025	Y	N	0.002	<0.001	0.004	**<0.01**	2	50	100
Mercury	A-T-025	Y	N	<0.0005	<0.0005	<0.001	**<0.005**	0.01	0.2	2
Molybdenum	A-T-025	Y	N	0.015	0.013	0.037	**0.130**	0.5	10	30
Nickel	A-T-025	Y	N	<0.001	<0.001	<0.002	**<0.01**	0.4	10	40
Lead	A-T-025	Y	N	0.002	<0.001	0.004	**<0.01**	0.5	10	50
Antimony	A-T-025	Y	N	0.001	<0.001	0.003	**<0.01**	0.06	0.7	5
Selenium	A-T-025	Y	N	0.002	<0.001	0.004	**<0.01**	0.1	0.5	7
Zinc	A-T-025	Y	N	0.017	<0.001	0.041	**0.020**	4	50	200
Chloride	A-T-026	Y	N	3	<1.00	8	**<10**	800	15000	25000
Fluoride	A-T-026	Y	N	0.7	0.6	1.6	**6.0**	10	150	500
Sulphate as SO_4	A-T-026	Y	N	16	3	39	**46**	1000	20000	50000
Total Dissolved Solids	A-T-035	N	N	160	59	392	**711**	4000	60000	100000
Phenol Index	A-T-050	N	N	<0.01	<0.01	<0.02	**<0.1**	1	-	-
Dissolved Organic Carbon	A-T-032	N	N	<20.0	<20.0	<40	**<200**	500	800	1000
Leach Test Information										
pH (pH Units)	A-T-031	N	Y	7.9	7.9					
Conductivity (µS/cm)	A-T-037	N	N	319	119					
Mass Sample (kg)				0.201						
Dry Matter (%)	A-T-044	N	N	79.5						
Stage 1										
Volume Leachant, L_2 (l)	A-T-046			0.350						
Filtered Eluate Volume, VE_1 (l)	A-T-046			0.150						
Stage 2										
Volume Leachant, L_8 (l)	A-T-046			1.280						

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Units 7 & 8, Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

Final Test Report

Envirolab Job Number:	18/03305		
Issue Number:	1	Date:	10-May-18

Client: Ian Farmer Associates (Newcastle)
Unit 4, Faraday Close
Pattinson North Industrial Estate
Washington
Tyne and Wear
NE38 8QJ

Project Manager:	Ceg[redacted]
Project Name:	South Tyneside District Hospital
Project Ref:	18678B
Order No:	73047
Date Samples Received:	30-Apr-18
Date Instructions Received:	1-May-18
Date Analysis Completed:	10-May-18

Notes - Soil analysis

All results are reported as dry weight (<40°C).

For samples with Matrix Codes 1 - 6 natural stones >10mm are removed or excluded from the sample prior to analysis and reported results corrected to a whole sample basis.

For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis.

Notes - General

This report shall not be reproduced, except in full, without written approval from Envirolab.

Subscript "A" indicates analysis performed on the sample as received. "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve, unless asbestos is found to be present in which case all analysis is performed on the sample as received.

All analysis is performed on the dried and crushed sample for samples with Matrix Code 7 and this supercedes any "A" subscripts.

All analysis is performed on the sample as received for soil samples from outside the European Union and this supercedes any "D" subscripts

Superscript "M" indicates method accredited to MCERTS.

For complex, multi-compound analysis, quality control results do not always fall within chart limits for every compound and we have criteria for reporting in these situations.

If results are in italic font they are associated with such quality control failures and may be unreliable.

A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid

Predominant Matrix Codes: 1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample

Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited

Secondary Matrix Codes: A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

IS indicates Insufficient sample for analysis, NDP indicates No Determination Possible and NAD indicates No Asbestos Detected.

Superscript # indicates method accredited to ISO 17025.

Analytical results reflect the quality of the sample at the time of analysis only. Opinions and interpretations expressed are outside the scope of our accreditation.

Please contact us if you need any further information.

Prepared by: [redacted]
Administrative Assistant

Approved by: [redacted]
Analytical Consultant

UKAS TESTING
No. 1247

mCERTS
THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

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Landfill WAC analysis must not be used for hazardous waste classification purposes. This analysis is only applicable for landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Sample Details								Landfill Waste Acceptance Criteria Limits		
Lab Sample ID	Method	ISO17025	MCERTS	18/03305/1						
Client Sample Number				Clay				Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Client Sample ID				M12004						
Depth to Top										
Depth to Bottom										
Date Sampled				27/04/2018						
Sample Type				Soil						
Sample Matrix Code				6						
Solid Waste Analysis										
pH (pH Units)$_D$	A-T-031	Y	Y	**7.71**				-	>6	-
ANC to pH 4 (mol/kg)$_D$	A-T-ANC	N	N	**0.2**				-	to be evaluated	to be evaluated
ANC to pH 6 (mol/kg)$_D$	A-T-ANC	N	N	**0.03**				-	to be evaluated	to be evaluated
Loss on Ignition (%)$_D$	A-T-030	Y	N	**13.8**				-	-	10
Total Organic Carbon (%)$_D$	A-T-032	Y	Y	**6.9**				3	5	6
PAH Sum of 17 (mg/kg) $_A$	A-T-019	N	N	**<0.08**				100	-	-
Mineral Oil (mg/kg)$_A$	A-T-007	N	N	**<10**				500	-	-
Sum of 7 PCBs (mg/kg)$_D$	A-T-004	N	N	**<0.007**				1	-	-
Sum of BTEX (mg/kg)$_A$	A-T-022	N	N	**<0.01**				6	-	-
Eluate Analysis				**2:1**	**8:1**	**2:1**	**Cumulative 10:1**	**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg (mg/kg)**		
				mg/l		**mg/kg**				
Arsenic	A-T-025	Y	N	0.002	0.002	0.007	**0.020**	0.5	2	25
Barium	A-T-025	Y	N	0.133	0.109	0.388	**1.220**	20	100	300
Cadmium	A-T-025	Y	N	<0.001	<0.001	<0.002	**<0.01**	0.04	1	5
Chromium	A-T-025	Y	N	<0.001	<0.001	<0.002	**<0.01**	0.5	10	70
Copper	A-T-025	Y	N	0.001	<0.001	0.004	**<0.01**	2	50	100
Mercury	A-T-025	Y	N	<0.0005	<0.0005	<0.001	**<0.005**	0.01	0.2	2
Molybdenum	A-T-025	Y	N	0.026	0.017	0.076	**0.200**	0.5	10	30
Nickel	A-T-025	Y	N	0.001	<0.001	0.003	**0.010**	0.4	10	40
Lead	A-T-025	Y	N	0.004	0.002	0.011	**0.020**	0.5	10	50
Antimony	A-T-025	Y	N	0.002	0.003	0.007	**0.030**	0.06	0.7	5
Selenium	A-T-025	Y	N	<0.001	<0.001	<0.002	**<0.01**	0.1	0.5	7
Zinc	A-T-025	Y	N	0.007	0.007	0.019	**0.080**	4	50	200
Chloride	A-T-026	Y	N	7	1	20	**20**	800	15000	25000
Fluoride	A-T-026	Y	N	0.7	0.5	2.0	**5.0**	10	150	500
Sulphate as SO_4	A-T-026	Y	N	20	38	57	**391**	1000	20000	50000
Total Dissolved Solids	A-T-035	N	N	151	141	440	**1550**	4000	60000	100000
Phenol Index	A-T-050	N	N	<0.01	<0.01	<0.02	**<0.1**	1	-	-
Dissolved Organic Carbon	A-T-032	N	N	<20.0	<20.0	<40	**<200**	500	800	1000
Leach Test Information										
pH (pH Units)	A-T-031	N	Y	7.9	7.7					
Conductivity (µS/cm)	A-T-037	N	N	302	282					
Mass Sample (kg)				0.200						
Dry Matter (%)	A-T-044	N	N	70.2						
Stage 1										
Volume Leachant, L_2 (l)	A-T-046			0.350						
Filtered Eluate Volume, VE_1 (l)	A-T-046			0.150						
Stage 2										
Volume Leachant, L_8 (l)	A-T-046			1.120						

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APPENDIX C

TABLE 1: SUMMARY OF INORGANIC CONTAMINATION TESTING RESULTS

Determinand	Units	Number of Samples above Level of Detection	Minimum Level	Maximum Level	Commercial Value	Number of Results Exceeding Threshold Value
Metals						
Cadmium	mg/kg				190	
Chromium III	mg/kg				8600	
Copper	mg/kg				68000	
Lead	mg/kg				2300*	
Inorganic Mercury	mg/kg				1100	
Molybdenum	mg/kg				17700**	
Nickel	mg/kg				980	
Zinc	mg/kg				730000	
Semi metals and non metals						
Arsenic	mg/kg				640	
Antimony	mg/kg				7550**	
Boron	mg/kg				240000	
Selenium	mg/kg				12000	
Inorganic chemicals						
Cyanide (total)	mg/kg				1580**	
W.S. Sulphate	mg/l				500+	
Other						
pH	pH				<5.5^	

* *Category 4 Screening Levels, March 2014*
** *CLEA Software Version 1.06 (pH7 and 1%SOM)*
^ *EA Threshold Values*
\+ *BRE Special Digest 1: 2005*

TABLE 2: SUMMARY OF ORGANIC CONTAMINATION TESTING RESULTS (COMMERCIAL)

Determinand	Units	Number of Samples above LOD	Minimum Level	Maximum Level	S4UL 1% SOM	S4UL 2.5% SOM	S4UL 6% SOM	Number of Results Exceeding Threshold Value
TPH Aliphatic Fractions								
C5-6	mg/kg				3200	5900	12000	
C6-8	mg/kg				77800	17000	40000	
C8-10	mg/kg				2000	4800	11000	
C10-12	mg/kg				9700	23000	47000	
C12-16	mg/kg				59000	82000	90000	
C16-35	mg/kg				1600000	1700000	1800000	
TPH Aromatic Fractions								
C5-7 (Benzene)	mg/kg				26000	46000	86000	
C7-8 (Toluene)	mg/kg				56000	110000	180000	
C8-10	mg/kg				3500	8100	17000	
C10-12	mg/kg				16000	28000	34000	
C12-16	mg/kg				36000	37000	38000	
C16-21	mg/kg				28000	28000	28000	
C21-35	mg/kg				28000	28000	28000	
Speciated PAH								
Naphthalene	mg/kg				190	460	1100	
Acenaphthylene	mg/kg				83000	97000	100000	
Acenaphthene	mg/kg				84000	97000	100000	
Fluorene	mg/kg				63000	68000	71000	
Phenanthrene	mg/kg				22000	22000	23000	
Anthracene	mg/kg				520000	540000	540000	
Fluoranthene	mg/kg				23000	23000	23000	
Pyrene	mg/kg				54000	54000	54000	
Benz' (a)anth' ene	mg/kg				170	170	180	
Chrysene	mg/kg				350	350	350	
Benz' (b)fluor' ene	mg/kg				44	44	45	
Benz' (k)fluor' ene	mg/kg				1200	1200	1200	
Benz' (a)pyrene	mg/kg				35	35	36	
Benz (ghi)per' ene	mg/kg				3900	4000	4000	
Diben(ah)anth'ene	mg/kg				3.5	3.6	3.6	
Id' (123cd)pyrene	mg/kg				500	510	510	
Total PAH	mg/kg				1000*	1000*	1000*	
Phenol	mg/kg				760	1500	3200	
* *EA Threshold Values*								

APPENDIX D

SOLMEK NOTES ON CONTAMINATION GUIDANCE (REF: VERSION 1/2019)

UK BACKGROUND

Environmental Protection Act 1990: Part 2A Revised Statutory Guidance (April 2012)

This revised document explains how the Local Authority should decide if land, based on a legal interpretation, is contaminated. The document replaces the previous guidance given in Annex 3 of DEFRA Circular 01/2006, issued in accordance with section 78YA of the 1990 Environmental Protection Act.

The main objectives of the Part 2A regime are to *"identify and remove unacceptable risks to human health and the environment" and* to *"seek to ensure that contaminated land is made suitable for its current use".*

Part 2A uses a risk based approach to defining contaminated land whereby the "risk" is interpreted as *"the likelihood that harm, or pollution of water, will occur as a result of contaminants in, on or under the land"* and by *"the scale and seriousness of such harm or pollution if it did occur".*

For a relevant risk to exist a contaminant, pathway and receptor linkage must be present before the land can be considered to be contaminated. The document explains that *"for a risk to exist there must be contaminants present in, on or under the land in a form and quantity that poses a hazard, and one or more pathways by which they might significantly harm people, the environment, or property; or significantly pollute controlled waters."*

A conceptual model is used to develop and communicate the risks associated with a particular site.

To determine if land is contaminated the local authority use various categories from 1 to 4. Categories 1 and 2 include *"land which is capable of being determined as contaminated land on grounds of significant possibility of significant harm to human health."*

Categories 3 and 4 *"encompass land which is not capable of being determined on such grounds".*

PRELIMINARY CONCEPTUAL MODEL

Preliminary Conceptual Models are undertaken in accordance with CIRIA C552. The Preliminary Conceptual Model assesses the consequence and the likelihood of a risk being realised to provide a risk classification, using the tables detailed below.

CONSEQUENCE OF RISK BEING REALISED (Based on C552 CIRIA, 2001)

Classification	Definition	Example
Severe	Short-term (acute) risk to human health, the environment, an element of the development or other aspect with is likely to result in *significant harm*, damage or both.	High concentrations of cyanide on the surface of an informal recreational area. Major spills of contaminants from site into controlled water. High concentrations of explosive gas in the subsurface environment that have a clear unobstructed pathway into buildings.
Moderate	Chronic damage to human health, a plausible chance that an event will occur, although the timeline is not immediate to be in the short-term.	Appreciable concentration of contamination that over the longer-term will cause significant harm i.e. high lead concentration in topsoil. Shallow mine workings that are potentially unstable but may remain in a satisfactory or stable conditions for a number of years.
Mild	Low level pollution of non-sensitive water, a feasible hazardous scenario although the timeline of such occurring can probably be considered in 10's of years.	The effect of high sulphate concentrations on structural concrete. Pollution of non-classified groundwater.
Minor	Harm, although not necessarily significant to human health, or with respect to other aspects of the development, which are considered implausible in terms of occurrence, or will have little consequential impact.	The presence of contaminants at such low concentrations that protective equipment is required during site works. Any damage to structures is minimal and will not be structural in characteristics.

PROBABILITY OF RISK BEING REALISED (C552 CIRIA, 2001)

Classification	Definition
High Likelihood	There is a viable pollutant linkage and an event that either appears very likely in the short term and almost inevitable over the long term, or there is evidence that the receptor has been harmed or polluted.
Likely	There is a viable pollutant linkage and all elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.
Low Likelihood	There is a viable pollutant linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the shorter term.
Unlikely	There is a viable pollutant linkage but circumstances are such that it is improbable that an event would occur even in the very long term.

RISK CLASSIFICATION MATRIX (C552 CIRIA, 2001)

Risk = Probability x Consequence		Consequence			
		Severe	**Moderate**	**Mild**	**Minor**
Probability	**High likelihood**	Very high risk	High risk	Moderate risk	Moderate/low risk
	Likely	High risk	Moderate risk	Moderate/low risk	Low risk
	Low likelihood	Moderate risk	Moderate/low risk	Low risk	Very low risk
	Unlikely	Moderate/low risk	Low risk	Very low risk	Very low risk

HUMAN RECEPTORS

Human exposure to contaminants present in soils can occur via several pathways. Direct exposure pathways include dermal absorption after contact with contaminated ground, inhalation of soil or dust, inhalation of volatised compounds, and inadvertent soil ingestion (or deliberate soil ingestion in the case of some children). Other indirect pathways include human ingestion of plants grown in contaminated soil or contaminated ground or surface water. Contaminants associated with wind blown dust can affect humans on surrounding sites.

VEGETATION

Plants can be affected by soil contamination in a number of ways resulting in growth inhibition, nutrient deficiencies and yellowing of leaves. Contaminants are taken up by plants through the roots and through foliage. Contaminants identified as being highly phytotoxic include boron, cadmium, copper, lead, nickel, and zinc.

To establish if the levels of contaminants present on a site may pose a risk to vegetation the results of the contamination testing are compared to a series of threshold values published in 'Code of Good Agricultural Practice for the Protection of Soil'.

GROUNDWATER AND SURFACE WATER RECEPTORS

The principal pathway by which soil contamination may reach the water environment is through a slow seepage or leaching to groundwater or surface water. The potential for contaminants to migrate along such pathways is dependent on the chemical and physical characteristics of the contaminants and the local hydrogeology. Surface watercourses may also accumulate contamination as contaminated sediments are deposited within the water body.

Where the site investigated overlies major/principal aquifers (and in some cases minor/secondary aquifers depending on certain conditions), groundwater Source Protection Zones and areas in close proximity to groundwater abstractions, contamination test results have been compared with the Water Supply (Water Quality) Regulations 1989 and The Water Supply (Water Quality) Regulations 2000.

Should a surface water receptor, such as a fresh water environment (river, canal, stream, lake etc), or marine environment be considered sensitive in relation to a site, then test results are compared with DEFRA & SEPA Environmental Quality Standards (2004). Many of the Environmental Quality Standards are hardness ($CaCO_3$) depended. Where no hardness values are available, Solmek assume conservative values (of between 0 and 50mg/l).

In the absence of vulnerable ground and surface water environments, Solmek may compare any test results with the Environment Agency Leachate Quality Threshold Values.

DETAILED QUANTITATIVE RISK ASSESSMENT (DQRA)

In line with CLR 11- Model Procedures, a DQRA for groundwater/human health may be required following a Phase 2 investigation and before the preparation of a Phase 3 Remediation Strategy. For human health DQRA, a site specific assessment criteria is undertaken using CLEA Software Version 1.06. For groundwater DQRA, the Environment Agency Remedial Targets Worksheet Version 3.1 is used.

WASTE ACCEPTANCE CRITERIA

The WAC testing relates to materials that are to be exported from a site/development to landfill, and do not directly relate to human health specifically. The WAC test categorises materials as either inert waste, non-reactive hazardous waste, and hazardous waste.

The testing results are generally presented as certificates which can be used by site owners/contractors etc, which should be presented to the accepting waste facility or waste contractor.

CONSTRUCTION MATERIALS

Materials at risk from possible soil contaminants include inorganic matrices such as cement and concrete and also organic material such as plastics and rubbers. Acid ground conditions and high levels of sulphates can accelerate the corrosion of building materials. Where pH and soluble sulphate analysis has been undertaken, Solmek compare the test results with the guidelines presented within BRE Special Digest 1, 2005 (3rd Edition) 'Concrete in Aggressive Ground'. Plastics and rubbers are generally used for piping and service ducts and are potentially attacked by a range of chemicals, most of which are organic, particularly petroleum based substances. Drinking water supplies can be tainted by substances that can penetrate piping and water companies enforce stringent threshold values.

The levels of potential contaminants should be compared to thresholds supplied in the UK Water Industry Research (UKWIR) publication "Guidance for the selection of Water Supply Pipes to be used in Brownfield Sites" (January 2011). A Brownfield Site is defined in the document as "Land or premises that have not previously been used or developed that may be vacant or derelict". It should be noted that Brownfield sites may not be contaminated. The guidance does not apply to Greenfield Sites however water companies may have their own assessment criteria which should be checked by the developer. The table below outlines the pipe material selection threshold concentrations.

	Pipe Material (Threshold concentrations in mg/kg)					
Parameter group	**PE**	**PVC**	**Barrier pipe (PE-AL-PE)**	**Wrapped Steel**	**Wrapped Ductile Iron**	**Copper**
Extended VOC suite by purge and trap or head space and GC-MS with TIC	0.5	0.125	Pass	Pass	Pass	Pass
+ BTEX + MTBE	0.1	0.03	Pass	Pass	Pass	Pass
SVOCs TIC by purge and trap or head space and GC-MS with TIC (aliphatic and aromatic C5-C10)	2	1.4	Pass	Pass	Pass	Pass
+ Phenols	2	0.4	Pass	Pass	Pass	Pass
+ Cresols and chlorinated phenols	2	0.04	Pass	Pass	Pass	Pass
Mineral oil C11-C20	10	Pass	Pass	Pass	Pass	Pass
Mineral oil C21-C40	500	Pass	Pass	Pass	Pass	Pass
Corrosive (Conductivity, Redox and pH)	Pass	Pass	Pass	Corrosive if pH <7 and conductivity >400µS/cm	Corrosive if pH <5, Eh not neutral and conductivity >400µS/cm	Corrosive if pH <5 or >8 and Eh positive
Specific suite identified as relevant following site investigation						
Ethers	0.5	1	Pass	Pass	Pass	Pass
Nitrobenzene	0.5	0.4	Pass	Pass	Pass	Pass
Ketones	0.5	0.02	Pass	Pass	Pass	Pass
Aldehydes	0.5	0.02	Pass	Pass	Pass	Pass
Amines	Fail	Pass	Pass	Pass	Pass	Pass

REQUIREMENTS OF PARTIES WITHIN THE DEVELOPMENT PROCESS

Interested parties involved in the development process may use the data in different ways and there may be varying views and interpretation of the factual data. Local Authority staff may have a view on contamination and human health and the wider environment. The Environment Agency are concerned principally with the protection of Controlled waters. Building insurers, funders and purchasers may be primarily concerned with issues of potential commercial blight. Purchasers are also not always fully informed, and perceptions on issues associated with risk can affect the decision to purchase. Developers and construction organisations will focus on financial aspects of dealing with the contamination in the context of the development and construction programme.

RISKS & LIABILITIES FROM CONTAMINATION

In simple terms, risks associated with contamination may be considered in terms of 1) statutory risks and 2) development related risks. If contamination is severe or forms a potential hazard based on its potential to affect groundwater, surface water or human health, a statutory risk may be present, and as such, if the risk is not reduced, criminal proceedings may be instigated by a government body or local authority.

If the contamination is less severe or not considered to be mobile, it may be considered a commercial liability which could, in theory remain untreated, but which may at a later date affect the value of the property, or, with changing legislation, become a statutory risk. Commercial liabilities could give rise to civil proceedings by third parties if there are grounds for action.

♠Solmek conditions of offer, notes on limitations & basis for contract (ref: version1/2019)

These conditions accompany our tender and supercede any previous conditions issued. Solmek will prepare a report solely for the use of the Client (the party invoiced) and its agent(s). No reliance should be placed on the contents of this report, in whole or in part by 3rd parties. The report, its content and format and associated data are copyright, and the property of Solmek. Photocopying of part or all of the contents, transfer or reproduction of any kind is forbidden without written permission from Solmek. A charge may be levied against such approval, the same to be made at the discretion of Solmek. Solmek was a trading name of Hymas Geoenvironmental Ltd.

Solmek cannot be held liable and do not warrant, or otherwise guarantee the validity of information provided by third parties and subsequently used in our reports. Solmek are not responsible for the action negligent of otherwise of subcontractors or third parties.

Site investigation is a process of sampling. The scope and size of an investigation may be considered proportional to levels of confidence regarding the ground and groundwater conditions. The exploratory holes undertaken investigate only a small volume of the ground in relation to the overall size of the site, and can only provide a general indication of site conditions. The opinions provided and recommendations given in this report are based on the ground conditions as encountered within each of the exploratory holes. There may be different ground conditions elsewhere on the site which have not been identified by this investigation and which therefore have not been taken into account in this report. Reports are generally subject to the comments of the local authority and Environment Agency. The comments made on groundwater conditions are based on observations made at the time that site work was carried out. It should be noted that mobile contamination, ground gas levels and groundwater levels may vary owing to seasonal, tidal and/or weather related effects. Solmek cannot be held liable for any unrecorded or unforeseen obstructions between exploratory boreholes and trial pits. This includes instances where previous structures on the site (buried man made structures) or the presence of boulder clay (cobbles and/or boulder obstructions) have been anticipated. All types of piling operations should make allowance for obstructions within the construction budget to accommodate this. Unrecorded ancient mining may occur anywhere where seams that have been worked and influence the rock and soil above. Dissolution cavities can occur where gypsum or chalk is present. Rotary drilling is the recommended technique to prove the integrity of the rock.

Where the scope of the investigation is limited via access to information, time constraints, equipment limitations, testing, interpretation or by the client or his agents budgetary constraints, elements not set out in the proposal and excluded from the report are deemed to be omitted from the scope of the investigation.

Desk studies are generally prepared in accordance with RICS guidelines. Environmental site investigations are generally undertaken as 'exploratory investigations' in accordance with the definitions provided in paragraph 5.4 of BS 10175:2001 in order to confirm the conceptual assumptions. You are advised to familiarize yourself with the typical scope of such an investigation. No pumping of water will be undertaken unless a licence or facilities/equipment have been arranged by others.

Where the type, number or/and depth of exploratory hole is specified by others, Solmek cannot and will not be responsible for any subsequent shortfall or inadequacy in data, and any consequent shortfall in interpretation of environmental and geotechnical aspects which may be required at a later date in order to facilitate the design of permanent or temporary works.

All information acquired by Solmek in the course of investigation is the property of Solmek, and, only also becomes the joint property of the Client only on the complete settlement of all invoices relating to the project. Solmek reserve the right to use the information in commercial tendering and marketing, unless the Client expressly wishes otherwise in writing. The quoted rates do not include VAT, and payment terms are 30 days from dispatch of invoice from our offices. Quotes are subject to a site visit.

We have allowed for 1 mobilisation and normal working hours unless otherwise stated. The scope of the investigation may be reviewed following the desk study and/or fieldwork. The presence or otherwise of Japanese Knotweed or other invasive plants can be difficult to identify especially during winter months. If Japanese Knotweed or other invasive species are suspect, it should be confirmed by an ecologist. We have not allowed for acquiring services information, and cannot be responsible for damage to underground services or pipes not shown to us or not clearly shown on plans. Costs incurred will be passed on to you, and in commissioning Solmek you understand and accept that you/your agent have a contractual relationship with Solmek & you accept this. Our rates assume unobstructed, reasonably level and firm access to the exploratory positions and adequate clear working areas and headroom. We have priced on the basis that you or your client have the necessary permissions, wayleaves and approvals to access land. All boreholes and pits are backfilled with arisings except where gas monitoring pipes are installed with stopcock covers. Solmek are not responsible for any uneven surfaces as a result of siteworks and rutting and backfilled excavations may require re-levelling and/or making good by others after fieldwork is complete, and Solmek has not allowed for this. No price has been provided or requested for a return visit to remove pipework and covers. Hourly rates apply to consultancy only and do not include expenses unless otherwise shown. If warranties are required, legal costs incurred will be passed on to you assuming Solmek agree to complete such warranties, modified or otherwise and you understand and agree to pay all costs.

We reserve the right to pursue full payment of the invoice prior to release of any information including reports. We advise you/your client that we may elect to pursue our statutory rights under late payment legislation, and will apply 8% to the base rate for unreasonably late payments. Solmek are exempt from the CIS Scheme. Solmek offer to undertake work only in strict accordance with conditions covered by our current insurances, which are available for inspection. Solmek are not responsible for acts, negligent or otherwise of subcontractors and as a matter of policy cannot indemnify any other parties. Professional indemnity Insurance is limited to ten times the invoice net total except where stated otherwise by Solmek. Solmek give notice that consequential loss as a direct or indirect result of Solmek's activities or omission of the same are excluded.